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1 CHAIN MESH NETWORK HOSE

2 The invention concerns a hose made of plastic or rubber  
3 material and reinforced with a mesh stocking for bearing  
4 fluids under pressure in the hydraulic sector or even in  
5 field of the distribution of fluids under pressure in open  
6 or closed circuits.

7 It is a known fact that the hoses mostly made of plastic  
8 material and suitable to bear fluids under pressure, pre-  
9 sent a first internal tubular layer made of plastic mate-  
10 rial or rubber, which is lined with a tubular fabric having  
11 the purpose of increasing the pressure resistance of the  
12 hose, of reducing its deformation and of increasing its  
13 performances.

14 One of the most used types of hose suited for the purpose,  
15 is the so-called "latticed" hose, in which the tubular  
16 layer of plastic material is reinforced with a series of  
17 threads wound in a spiral over the hose, said threads being  
18 arranged parallel, equally spaced and overlaying as many  
19 other transversal threads arranged at a symmetrical angular  
20 position in relation to an axis parallel to the hose axis,  
21 so as to form a regular rhombus lattice. This latticed  
22 fabric, wound on the external surface of said inner hose  
23 layer, is then attached through another external layer  
24 generally, but not necessarily, transparent which secures  
25 the latticed fabric to the hose itself. With this type of  
26 stocking the hose is suitable to bear a higher pressure  
27 than a hose without stocking, without any substantial  
28 deformations occurring, since the weaving does not yield  
29 and therefore prevents the inner layer of the hose from  
30 deforming.

31 A limit of the just described latticed hose consists in  
32 that its flexibility is relatively low, i.e. the bending  
33 radii under which the hose can be subjected, are rather  
34 wide in relation to the meshed hoses.

35 Another type of just as well-known flexible hose is the

1 hose in which the stocking wound over the external part of  
2 the hose is made in the shape of a network. It is a known  
3 fact that the network is a special kind of weaving obtained  
4 with one or more threads which are linked together with  
5 more or less winding loops, also called "bushes" or  
6 "elementary meshes", which give to said mesh-network fabric  
7 a characteristic of high elasticity.

8 The so-called "chain" mesh-network, consists of a series of  
9 threads parallel to one another and fed by many reels,  
10 which are bent so as to obtain as many rows of meshes  
11 having a tie both following the weft direction and the  
12 chain direction, their interlacing creating a transversal  
13 series of mesh lines and a longitudinal series of mesh  
14 rows, or ribs.

15 One of the most used hoses in the market, is the hose  
16 wherein the network is of the tricot chain type. It will be  
17 understood that in the technical jargon of the field the  
18 tricot mesh-network is the type of mesh-network wherein  
19 each thread forms the mesh by interlacing with one or more  
20 threads on its right and with one or more threads on its  
21 left.

22 If, on one hand, the tricot mesh-network hose presents a  
23 higher flexibility, since, as is known, the mesh becomes  
24 more flexible when the hose diameter increases because of  
25 the increased pressure, on the other hand, the limit of the  
26 mesh fabric and in particular of the hose with the tricot  
27 mesh, is that with the pressure increase, the hose is  
28 subjected to a torsional effect caused by the fluid flowing  
29 under pressure within the same. This is due to the spiral  
30 run of the mesh lines which, as opposed to the essentially  
31 longitudinal run of the rows, cause an out-of-balance  
32 reaction and in particular a torque of the hose.

33 The main proposed purpose of the invention is to eliminate  
34 the above mentioned inconveniences.

35 In particular the torque effect which occurs in the mesh-

1 network fabric is to be eliminated, without having to  
2 sacrifice the advantages offered by the mesh-network as  
3 regards the flexibility and the pressure explosion.

4 All the above mentioned purposes and others which will be  
5 better pointed out hereinafter, are obtained with the hose  
6 according to the invention which, in accordance with the  
7 content of the first claim, comprises, from the interior to  
8 the exterior:

9 - at least one inner tubular layer of plastic or rubber  
10 material;

11 - a chain-type mesh-network presenting mesh lines and mesh  
12 rows, having a tubular shape and wound on the external  
13 surface of said inner layer;

14 - a possible external layer for the protection of said  
15 mesh-network, characterized in that said mesh rows are  
16 slanted in relation to the longitudinal axis of the hose.

17 Further characteristics and scope of applicability of the  
18 present invention will become apparent from the detailed  
19 description given hereinafter. However, it should be under-  
20 stood that the detailed description and specific example,  
21 while indicating a preferred embodiment of the invention,  
22 are given by way of illustration only, since various chan-  
23 ges and modifications within the spirit and scope of the  
24 invention will become apparent to those skilled in the art  
25 from this detailed description and from the drawings,  
26 wherein:

27 - Fig. 1 shows a front view of a hose coated with a chain  
28 mesh-network according to the known technique;

29 - Fig. 2 shows the hose according to the invention;

30 - Fig. 3 is a cross-section of the hose of Fig. 2.

31 With reference to the mentioned Figures, it can be observed  
32 that the hose mesh-network of Fig. 1, showing a hose with a  
33 mesh-network manufactured according to the known technique,  
34 is formed by chain meshes of the tricot type. Said meshes  
35 form some lines, indicated with 1, parallel to one another,

1 and some longitudinal rows, indicated with 2, which are  
2 essentially parallel to the X axis of the hose.

3 This type of mesh weaving is directly realized on the hose  
4 20 by so-called mesh-weaving machines, which are present on  
5 the market, their performance in mesh forming being well  
6 known.

7 Fig. 2 shows the hose according to the invention, wherein,  
8 on the inner layer 3 of the hose 10 the chain mesh-network,  
9 indicated as a whole with 4, is woven, it being formed by  
10 lines 5, parallel to one another, slanted in relation to  
11 the Y axis of the hose 10 of Fig. 2, and by rows 6 also  
12 being slanted in relation to an axis parallel to the Y  
13 axis, but following a direction opposite to that of the  
14 lines 5.

15 With this crossed arrangement, and transversal in relation  
16 to the Y axis of the hose, the torque which occurred and  
17 concerned the hose, when the latter was wound on a normal  
18 chain-type mesh-network with essentially longitudinal rows,  
19 is eliminated.

20 In fact, in the specific case of Fig. 2, wherein the rows  
21 are arranged following a transversal direction rather than  
22 a longitudinal one, the rotational force component is  
23 compensated, which occurred because of the spiral winding  
24 of the lines 5.

25 With such a type of network, the forces resulting from the  
26 mesh rows and from the mesh lines, compensate each other  
27 until they eliminate each other, thus making the hose 10  
28 insensitive to the so-called spiral movement effect, when  
29 said hose is subjected to a tension because of the fluid  
30 flowing under pressure.

31 An external layer 7, made of plastic or rubber, secures the  
32 thus obtained chain mesh-network on the hose surface, as is  
33 the case, in all the hoses manufactured according to the  
34 known technique.

35 One type of machine weaving the chain mesh-network type

1 with the mesh rows arrangement being slanted in relation to  
2 the longitudinal axis, is disclosed in the Italian patent  
3 application for invention No. VI93A000077 in the name of  
4 the same applicant filed on May 13, 1993. In said machine  
5 the cage wherein there are needles which weave the chain  
6 mesh-network, rotates independently in respect of the  
7 turntable supporting the reels, the distributors of the  
8 yarns and the cams that move the needles alternatively.

9 The slant of the mesh rows, in respect of the longitudinal  
10 axis of the mesh-network depends only on the difference  
11 between the rotation of the cage and of the turntable  
12 supporting all devices as above.

13 It is important to underline that the slant of the mesh  
14 rows can be modified according to selected angles, also in  
15 relation to the hose material, its diameter, the type of  
16 network, the number of reels, the pitch of the lines and  
17 rows, as well as of the type and/or the thread title.

18 Moreover, it will be pointed out, that the tricot-type  
19 mesh-network, shown in the drawing of Fig. 2, can also be  
20 a chain-type mesh-network differing from the tricot type,  
21 it being understood that all the hoses reinforced with  
22 chain types mesh-network presenting mesh rows slanted in  
23 relation to the longitudinal axis of the hose, independen-  
24 tly from the special type of chain mesh-network which is  
25 to be realized still remain within the spirit and the scope  
26 of the invention.

27 Therefore, the same results can be obtained with chain  
28 mesh-networks of the plain tricot type, double tricot or  
29 plain atlas, double atlas, koper and chain, as well as  
30 other chain mesh-network types.

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